

Appl. No. 10/631,124  
Original Response dated 02/28/06  
Reply to Office Action of 11/02/05  
Resubmission dated 03/20/06  
Reply to Notice of Non-Compliant Amendment dated 03/10/06

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of the Claims:**

1. (currently amended) A single acentric, rhombohedral lanthanide borate crystal comprising having the formula  $\text{LnBO}_3$ , wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y, and having a dimension of at least 1 mm in at least one direction, made by the process comprising the steps of:  
providing a pressure vessel having a growth zone and a dissolving zone;  
providing a seed crystal having the formula  $\text{LnBO}_3$ ,  
wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y;  
positioning the seed crystal in the growth zone of the pressure vessel;  
providing a medium comprising powdered  $\text{LnBO}_3$  and at least one member selected from the group consisting of aqueous hydroxide ions, aqueous carbonate ions, soluble nitrate anions,

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soluble fluoride anions, soluble chloride anions and combinations

thereof in the dissolving zone; and

heating and pressurizing the vessel such that a growth  
temperature is produced in the growth zone, a dissolving  
temperature is produced in the dissolving zone, and a temperature  
gradient is produced between the growth zone and the dissolving  
zone, whereby growth of the crystal is initiated, the growth  
temperature ranging from about 300°C to about 500°C, the  
dissolving temperature ranging from about 450°C to about 600°C,  
the temperature gradient ranging between about 10°C and about  
100°C between the warmer dissolving zone and the cooler growth  
zone, and the pressure ranging from about 5 kpsi to about 30 kpsi.

2. (original) The lanthanide borate crystal set forth in claim 1 wherein the crystal exhibits non-linear optical properties.
3. (currently amended) An acentric, rhombohedral lanthanide borate crystal as set forth in claim 1 comprising wherein the step of providing a seed crystal having the formula LnBO<sub>3</sub>, wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y comprises providing a seed crystal

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having the formula  $\text{Ln}_y\text{Ln}_x\text{BO}_3$ , wherein  $\text{Ln}_x$  is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y and wherein  $\text{Ln}_y$  is selected from the group consisting of La, Ce, Pr, Nd, Y, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and Cr and mixtures thereof, wherein  $\text{Ln}_x$  and  $\text{Ln}_y$  are differing ions and wherein the molar ratio of  $\text{Ln}_y:\text{Ln}_x$  is from about 1:99 to about 20:80.

4. (original) The lanthanide borate crystal set forth in claim 3 comprising an active gain medium for a laser.
5. (original) The lanthanide borate crystal set forth in claim 4 wherein the lasing crystal comprises a self-frequency doubler.
6. (canceled) A method for growing a single rhombohedral lanthanide borate crystal comprising :  
reacting  $\text{B}_2\text{O}_3$  and  $\text{Ln}_2\text{O}_3$ , wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y, in an aqueous solution at a temperature of from about 350°C to about 600°C and at a pressure of from about 8 kpsi to about 30 kpsi.

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7. (canceled) The method set forth in claim 6 wherein the step of reacting  $B_2O_3$  and  $Ln_2O_3$  comprises reacting  $B_2O_3$ ,  $(Ln_x)_2O_3$ , and  $(Ln_y)_2O_3$  wherein  $Ln_x$  is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y and wherein  $Ln_y$  is selected from the group consisting of La, Ce, Pr, Nd, Y, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and Cr and mixtures thereof, wherein  $Ln_x$  and  $Ln_y$  are differing ions and wherein the molar ratio of  $(Ln_x)_2O_3$  and  $(Ln_y)_2O_3$  to  $B_2O_3$  is 1:1 and wherein the molar ratio of  $(Ln_x)_2O_3$  to  $(Ln_y)_2O_3$  is from about 99:1 to about 80:20.

8. (canceled) A single acentric, rhombohedral lanthanide borate crystal comprising the formula  $LnBO_3$ , wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y, made by the method comprising:

reacting  $B_2O_3$  and  $Ln_2O_3$ , wherein Ln is selected from the group consisting of Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y, in an aqueous solution at a temperature of from about 350°C to about 600°C and at a pressure of from about 8 kpsi to about 30 kpsi.

9. (canceled) The lanthanide borate crystal set forth in claim 8 comprising a dimension of at least 1 mm in at least one direction.